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10/522,524	01/26/2005	Kouichi Masuda	2005_0090A	7415

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EXAMINER	
LIU, LI	
ART UNIT	**PAPER NUMBER**
2613	
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09/24/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/522,524	MASUDA ET AL.	
	Examiner	**Art Unit**	
	LI LIU	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _20 June 2008_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-31 and 35_ is/are pending in the application.

4a) Of the above claim(s) _7-16,18,19,21,22,24,25,27,28,30,31 and 35_ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-6,17,20,23,26 and 29_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _26 January 2005_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 6/20/2008 with respect to claim 1 has been fully considered but they are not persuasive. The examiner has thoroughly reviewed Applicant's amendment and arguments but firmly believes that the cited reference reasonably and properly meet the claimed limitation as rejected.

1). Applicant's argument – "Modifying the system of Piehler based on the teachings of Berthold so as to choose only the strongest signal of the two transmission lines (as in Berthold et al.) would not result in or render obvious the system recited in claim 1 because such a modification would render the optical transmission system of Piehler without the ability to remove noise from the system, which goes against the teaching of Piehler. Using identical signals on the transmission lines (as in Berthold et al.) would result in a loss of the signal in the balanced receivers in the optical transmission system of Piehler. Nor would redundancy in the individual transmission lines of Piehler, as disclosed in Berthold et al., result in the present invention. Thus, Piehler and Berthold et al. do not disclose or suggest the combination of features as recited in claim 1".

Examiner's response – In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one

of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In this case, Piehler teaches a control station for generating two phase-conjugated optical signals and transmitting the generated two phase-conjugated optical signals via two optical fibers respectively (Figures 1, 2, 4 and 6); and at least one base station for receiving the two phase-conjugated optical signals transmitted in the predetermined transmission form from the control station via the via two optical fibers.

Piehler uses two phase-conjugated optical signals and balanced receiver to increase the carrier to signal ratio (CNR) for the transmission system. Piehler does not expressly teach the base station selectively processing one of the received two phase-conjugated optical signals that has a greater signal power intensity.

Piehler also discloses that the balanced receivers require that at the receiver the opposite polarity between the two signals needs maintained and the difference between the two optical links/fibers must be within a specific range (column 1 line 50-54).

Berthold et al teaches a receiving system with switch to select an alternate communication path or selectively process one of the received optical signals based on a greater signal power intensity. Compared to the single optical signal via single link system, the CNR in a two phase-conjugated optical signals system is also improved when the receiving system selects one of the received optical signals based on a higher signal power intensity. And at same time, by using just one signal from one of the two links, the requirement of the phase adjustment and length different can be relaxed.

Berthold and Piehler show each individual elements and its function, as described in claim 1 of applicant, albeit shown in separate references. Both Berthold and Piehler teach to increase the reliability of the optical transmission system. The result of substitution of the receiver with selective switch for the balanced receivers is predictable, and the combination of Berthold and Piehler is practicable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the switching system and method as taught by Berthold et al to the system of Piehler so that a simple structure receiver system with improved CNR can be obtained.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 3, 6, 17, 20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piehler (US 6,304,369) in view of Berthold et al (US 7,174,096).

1). With regard to claim 1, Piehler discloses a radio frequency optical transmission system (Figures 1, 2, 4 and 6) for optically transmitting a radio frequency signal, the system comprising:

a control station (Figure 6, or 110 and 120 in Figures 1, 2, 4) for generating two phase-conjugated optical signals (130 and 140 in Figures 1, 2, 4 and 6) having their

intensities modulated with the radio frequency signal (the RF signal in Figures 1, 2, 4 and 6, the EOM 120 creates an amplitude/intensity modulated optical signal, column 1, line 12-20), and transmitting the generated two phase-conjugated optical signals (the signals 130 and 140 are phase-conjugated optical signals, or are complementary signals, 180^{o} out of phase with each other, Figures 1, 2, 4 and 6) in a predetermined transmission form (the amplitude modulated complementary optical signals, Figures 1, 2, 4 and 6) via two optical fibers (the optical fibers 150 etc in Figures 1, 2, 4 and 6, one fiber for signal 130, and another fiber for signal 140), respectively; and

at least one base station (e.g., 160 in Figures 1, 2, 4, and Figures 3A and 3B) for receiving the two phase-conjugated optical signals transmitted in the predetermined transmission form from the control station via the two optical fibers, respectively.

Piehler uses balanced receivers to detect the two phase-conjugated signals.

But, Piehler does not expressly teach the base station selectively processing one of the received two phase-conjugated optical signals that has a greater signal power intensity.

However, to selectively process one of the received optical signals based on a greater signal power intensity is well known and widely used in the art. Berthold et al teaches a receiving system with switch to select an alternate communication path or selectively process one of the received optical signals based on a greater signal power intensity (e.g., Figures 1-5 and 7, and column 3, line 1-11 and line 24-30, the deterioration of signals, loss of signals, signal to noise ratio etc.).

In Piehler's system, the balanced receivers are used to process the two optical signals from different path and then the signal-to-noise ratio or carrier-to-noise ratio CNR is increased. However, the balanced receivers require that at the receiver the opposite polarity between the two signals needs maintained and the difference between the two optical links/fibers must be within a specific range (column 1 line 50-54). By using just one signal from one of the two links, the requirement of the phase adjustment and length different can be relaxed. Berthold and Piehler show each individual elements and its function, as described in claim 1 of applicant, albeit shown in separate references. Both Berthold and Piehler teach to increase the reliability of the optical transmission system. The combination of Berthold and Piehler achieves practicable and predictable result of reliable and good CNR transmission system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the switching system and method as taught by Berthold et al to the system of Piehler so that a simple structure receiver system with improved signal to noise ratio and without signal degradation due to the dispersion can be obtained.

2). With regard to claim 2, Piehler and Berthold et al disclose all of the subject matter as applied to claim 1 above. And Piehler and Berthold et al further disclose wherein the control station includes:

a light source (110 in Figures 1, 2, 4 and 6) for outputting an optical signal; and

an optical intensity modulation section (the EOM 120 in Figures 1, 2, 4, and 6) for modulating an intensity of the optical signal outputted from the light source with the radio frequency signal (the RF signal drive the EOM 120 to create an

amplitude/intensity modulated optical signal, column 1, line 12-20), and for generating the two phase-conjugated optical signals based on the optical signal having its intensity modulated (the signals 130 and 140 are phase-conjugated optical signals, or are complementary signals, 180° out of phase with each other, Figures 1, 2, 4 and 6), and transmitting the generated two phase-conjugated optical signals via the two optical fibers (the optical fibers 150 etc in Figures 1, 2, 4 and 6), respectively.

3). With regard to claim 3, Piehler and Berthold et al disclose all of the subject matter as applied to claims 1 and 2 above. And Piehler and Berthold et al further disclose wherein the at least one base station includes:

a light reception section (e.g., Figure 3 of Piehler) for converting the predetermined optical signal into a radio frequency signal (e.g., the RF Output in Figures 1, 2, 4 and 6).

But, Piehler uses balanced receiver to output the RF signals.

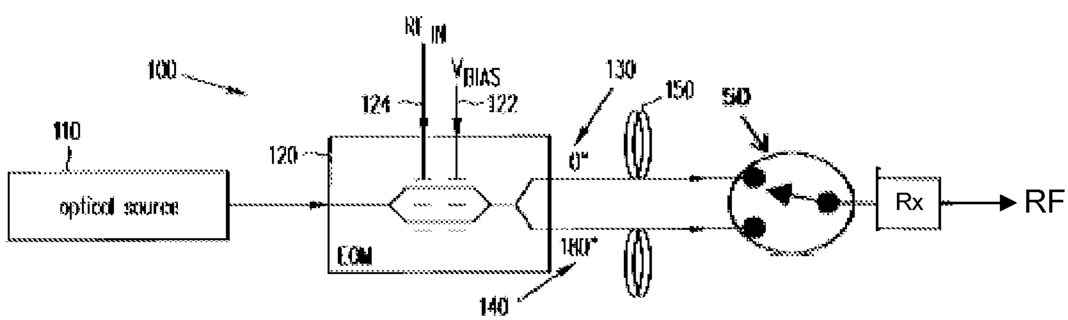

Figure O1

However, Berthold et al teaches the input switching section (e.g., 50 in Figures 1-3 of Berthold). Therefore, for the same reason as discussed above, the combination of

Piehler and Berthold et al (refer Figure O2 above) teach the input switching section for receiving the two phase-conjugated optical signals via two optical fibers (two signals are received by the switch 50, Figures 1-3 of Berthold et al, or Figure O1 above), respectively, and selectively outputting a predetermined one of the received two phase-conjugated optical signals in accordance with a transmission distance to the control station; and the light reception section (e.g., the Rx in Figure O1) for converting the predetermined optical signal selectively outputted from the input switching section into a radio frequency signal.

4). With regard to claim 6, Piehler and Berthold et al disclose all of the subject matter as applied to claims 1 and 2 above. And Piehler and Berthold et al further disclose wherein the at least one base station includes:

an input switching section (e.g., 50 in Figure O1 above) for receiving the two phase-conjugated optical signals via two optical fibers, respectively, and selectively outputting one of the received two phase-conjugated optical signals;

a light reception section (Rx in Figure O1) for converting the optical signal selectively outputted from the input switching section into a radio frequency signal (the combination of Piehler and Berthold et al teaches to output the RF signal from the receiver, Figure O1).

But, Piehler and Berthold et al does not expressly state a level comparison section and a control section for controlling the input switching section.

However, as disclosed by Berthold, a control signal is used to selectively active the switch (column 3 line 17-44). And the condition of the signal at the receiver is judged

or compared so to determine how the switch 50 is chosen. And Table 1 in column 3 lists how the switch or selector 50 may be programmed to choose when to connect to diverse optical path 42 or 44. Therefore, it is obvious that the level comparison section and the control section must be present in the receiving system so that the signal quality or intensity can be determined and the switch status can be chosen. That is, the combination of Piehler and Berthold et al teach a level comparison section for receiving the radio frequency signal outputted from the light reception section (column 3 line 17-63 of Berthold), and comparing the received radio frequency signal and a previously received radio frequency signal with respect to a signal power intensity; and a control section for controlling, based on a comparison result obtained from the level comparison section, the input switching section such that the light reception section always receives a radio frequency signal having a greater signal power intensity (Figure 7 and column 3 line 17-63 of Berthold, or Figure O1 above).

5). With regard to claim 17, Piehler and Berthold et al disclose all of the subject matter as applied to claims 1 and 2 above. And Piehler and Berthold et al further disclose wherein the optical intensity modulation section includes a Mach-Zehnder interferometer (the EOM in Figures 1, 2, 4-6 can be a M-Z interferometer, column 6 line 6-18).

6). With regard to claim 20, Piehler and Berthold et al disclose all of the subject matter as applied to claims 1 and 2 above. And Piehler and Berthold et al further disclose wherein the optical intensity modulation section is made of a crystal having an

electrooptic effect (the EOM 120 in Figures 1, 2, 4-6 can be LiNbO3 or InP crystals having an electrooptic effect, column 1, line 39-41, and column 6, line 6-18).

7). With regard to claim 23, Piehler and Berthold et al disclose all of the subject matter as applied to claims 1, 2 and 20 above. And Piehler and Berthold et al further disclose wherein the crystal having the electrooptic effect is lithium niobate (the EOM 120 in Figures 1, 2, 4-6 can be LiNbO3 crystal having an electrooptic effect, column 1, line 39-41, and column 6, line 6-18).

4. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piehler (US 6,304,369) and Berthold et al (US 7,174,096) as applied to claims 1 and 2 above, and in further view of Henmi (US 6,137,603) and Toba et al (Toba et al: “An Optical FDM-Based Self-Healing Ring Network Employing Arrayed Waveguide Grating Filters and EDFA’s with Level Equalizers”, IEEE Journal on Selected Areas in Communications, Vol. 14, No.5, June 1996, pages 800-813).

Piehler and Berthold et al disclose all of the subject matter as applied to claims 1 and 2 above. And Piehler further disclose wherein the at least one base station includes:

a first light reception section (e.g., the one Rx at the top of the Figures 1, 2 and 4, or 310 in Figure 3A) for receiving one of the two phase-conjugated optical signals via one of the two optical fibers, and converting the received optical signal into a radio frequency signal (column 2 line 29-49);

a second light reception section (e.g., the one Rx at the bottom of the Figures 1, 2 and 4, or 320 in Figure 3A) for receiving another one of the two phase-conjugated

optical signals via another of the two optical fibers, and converting the received optical signal into a radio frequency signal (column 2 line 29-49).

Piehler uses balanced receivers to detect the two phase-conjugated signals. And the balanced receivers output the resultant RF signal, and increase the signal-to-noise ratio or carrier-to-noise ratio.

Berthold et al teaches a switch that is directly coupled to the two fiber links and the receiver (32 in Figures 1-3 of Berthold) is after the switch (Figures 1-3 of Berthold or Figure O1 above). And as discussed in claim 5 rejection, a level comparison section and a control section must be present in the receiving system so that the signal quality or intensity can be determined and the switch status can be chosen (column 3 line 17-63 of Berthold).

The combination of Piehler and Berthold as plotted in Figure O1 does not expressly teach an input switching section for receiving the radio frequency signals respectively outputted from the first and second light reception sections, and selectively outputting a predetermined one of the received radio frequency signal in accordance with a transmission distance to the control station; and a level comparison section for receiving the radio frequency signals respectively outputted from the first and second light reception sections, and comparing the radio frequency signals with respect to a signal power intensity; and a control section for controlling, based on a comparison result obtained from the level comparison section, the input switching section so as to select one of the radio frequency signals which has a greater signal power intensity.

However, although Piehler and Berthold don't specifically disclose the switch receives the signals from the two receivers, such limitation are merely a matter of design choice and would have been obvious in the system of Piehler and Berthold. Piehler and Berthold teach that the switch is used to selectively choose one of the optical signals based on the signal quality. The limitations in claims 4 and 5 do not define a patentably distinct invention over that in Piehler and Berthold since both the invention as a whole and Piehler and Berthold are directed to selectively process one of the received optical signals based on the signal quality. To put the switch in front of the receiver or after the two receivers is inconsequential for the invention as a whole and presents no new or unexpected results, so long as the higher quality signal is successfully selected. Therefore, to have the switch installed after the two receivers would have been a matter of obvious design choice to one of ordinary skill in the art.

Another prior art, Henmi, in the same field of endeavor, teaches a receiver system in which two receivers are used to receive the optical signals from two optical links (Figure 2, the two optical receivers 1052 and 1053 receives signals from fibers 1021 and 1022, respectively) and a switch (1072 in Figure 2) is used to select one of the two received signals (column 1, line 26-44).

Also, Toba et al teaches that at receiver side two receivers (OR in Figure 2) are used to receive the optical signals from two individual paths and to output the electrical signals to the switch (Figure 2), and the switch determines which connection to be chosen.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the receivers/switch arrangement as taught by Henmi and Toba et al to the system of Piehler and Berthold so that the signal degradation can be effectively monitored and a simple structure receiver system can be obtained.

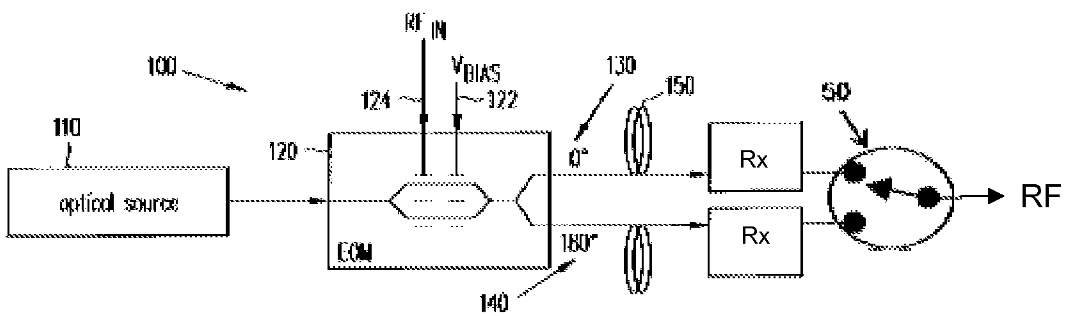

Figure O2

That is the combination of Piehler and Berthold and Henmi and Toba et al teaches an input switching section for receiving the radio frequency signals respectively outputted from the first and second light reception sections (the two receivers Rx in Figure O2 above), and selectively outputting one of the received radio frequency signals (the output RF in Figure O2); a level comparison section for receiving the radio frequency signals respectively outputted from the first and second light reception sections (column 3 line 17-63 of Berthold), and comparing the radio frequency signals with respect to a signal power intensity; and a control section for controlling, based on a comparison result obtained from the level comparison section, the input switching section so as to select one of the radio frequency signals which has a greater signal power intensity (column 3 line 17-63 of Berthold).

5. Claims 26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piehler (US 6,304,369) and Berthold et al (US 7,174,096) as applied to claims 1 and 2 above, and in further view of Miyauchi et al (US 5,877,881) and Gnauch et al (US 5,303,079).

Piehler and Berthold et al disclose all of the subject matter as applied to claims 1 and 2 above. And Piehler further disclose wherein the wavelength range of the light source is a 1.55 μm range (column 4, line 63-66); and the fibers are the single mode fibers (SMFs).

But Piehler and Berthold et al does not expressly states that the zero-dispersion wavelength ranges of the two optical fibers are different from the wavelength range of the light source; or wherein the zero-dispersion wavelength ranges of the two optical fibers are a 1.3 μm range.

However, as disclosed by Miyauchi et al, the type of fiber currently most popular and widely installed is the single-mode fiber (SMF) which has zero dispersion wavelength in the 1.3 μm band. This is because, in the case of a fiber with a relatively simple structure consisting of a uniform clad and core, the longest wavelength where zero dispersion can be achieved is 1.3 μm, and the 1.3 μm band, where fiber attenuation is considered low, has traditionally been used as the band for signal light wavelength (column 2, line 15-26).

And another prior art, Gnauch et al, also teaches a system operated at 1.5 μm using a fiber having a zero dispersion wavelength of approximately 1.3 μm (column 3, line 21-23).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a fiber having a zero dispersion wavelength of 1.3 μm range as taught by Miyauchi et al and Gnauch et al to the system of Piehler and Berthold so that the attenuation is low, and pulse shape can be properly maintained and a relatively simple structure transmission link can be obtained.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Rollins (US 7,079,780);

Ackerman (US 6,246,500);

Banba et al (US 5,724,459);

Pfeiffer (US 6,925,219);

Jasti (US 6,944,362);

Corke et al (US 5,510,917);

Kumozaki et al (US 5,539,564).

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. L./
Examiner, Art Unit 2613
September 17, 2008

/Kenneth N Vanderpuye/
Supervisory Patent
Examiner, Art Unit 2613